

Calculus

HW 33: Unit 3.7 – Particle Motion

Name: _____

Date: _____ Period: _____

1. The accompanying figure shows the velocity $v = \frac{ds}{dt} = f(t)$ (m/sec) of a body moving along a coordinate line.

a) When does the body reverse direction?

b) When (approximately) is the body moving at a constant speed?

c) What is the particles acceleration at $t = 7 \text{ sec}$?

d) When is the particle moving left & right?

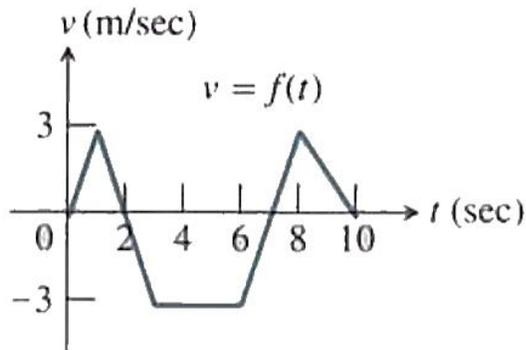
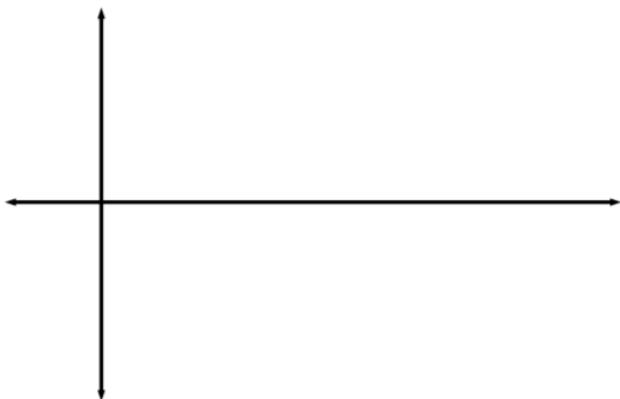
Left:

Right:

e) Graph the body's:

Speed for $0 \leq t \leq 10$.

Acceleration, where defined.



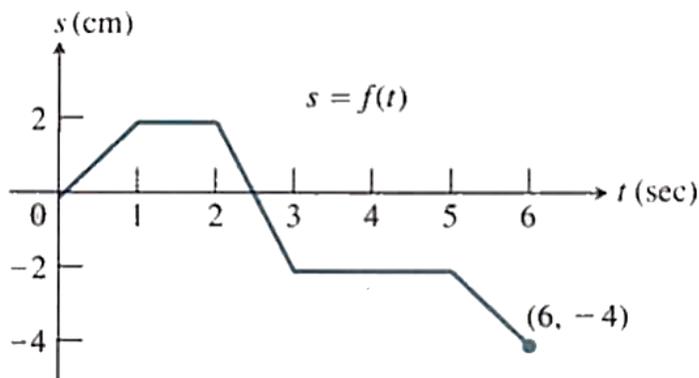
2. The position of a particle moving along a line is shown as a function of time t .

(a) When is P moving left & right?

Left:

Right:

(b) Standing Still:

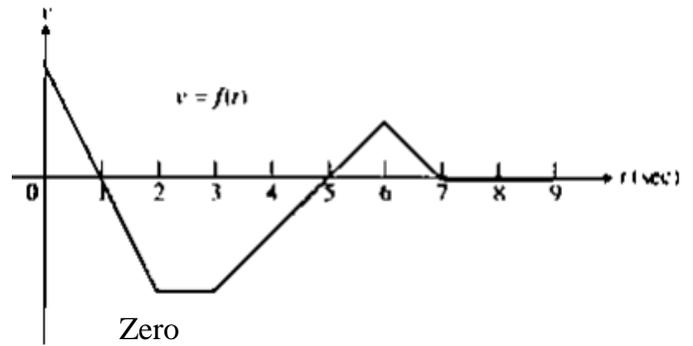


3. The accompanying figure shows the velocity, $v = f(t)$, of a particle moving on a coordinate line.

(a) When does the particle:

Speed Up

Slow Down



(b) When is the particle's acceleration?

Positive

Negative

(c) When does the particle move at its greatest speed?

(d) When does the particle stand still for more than an instant?

4. A racehorse is running a 10-furlong race. (A furlong is 220 yards, although we will use furlongs and seconds as our units in this exercise. As the horse passes each furlong marker (F), a steward records the time elapsed (t) since the beginning of the race, as shown in the table below:

F	0	1	2	3	4	5	6	7	8	9	10
t	0	20	33	46	59	73	86	100	112	124	135

(a) How long does it take the horse to finish the race?

(b) What is the average speed of the horse over the first 5 furlongs?

(c) What is the approximate speed of the horse as it passes the 3-furlong marker?

(d) During which portion of the race is the horse running the fastest?

(e) During which portion of the race is the horse accelerating the fastest?

5. A particle moves along a line so that its position at any time $t > 0$ is given by the function:

$s(t) = t^2 - 3t + 2$, where s is measured in meters and t is measured in seconds.

(a) Find the displacement during the first 5 seconds.

(b) Find the average velocity during the first 5 seconds.

(c) Find the instantaneous velocity when $t = 4$.

(d) Find the acceleration of the particle when $t = 4$.

(e) At what values of t does the particle change direction?

(f) Where is the particle when s is a minimum?